The Perceived Risk of Purchasing OTC Drugs: A Comparative Study of Pharmacies with Different Levels of Digitalization

Semra Ersöz
Research Assistant
Department of Marketing and Retail
University of Duisburg-Essen

Email:semra.ersoez@wiwinf.uni-due.de
https://orcid.org/0000-0002-6044-7088

ABSTRACT

Brick-and-mortar pharmacies are facing strong competition from online pharmacies and are using digital techniques in their salesrooms as a counterstrategy. This study examines how digitalization affects purchase intentions among German customers. Perceived purchase risk, as a barrier to purchase, is compared for three types of pharmacies: non-digitalized pharmacies with conventional product displays (shelves) for products, digitalized pharmacies with digital signage displays for product presentation, and online pharmacies. Six risk types (performance, physical, psychological, financial, social, and privacy risks) and their effects on overall risk perception as well as purchase intentions are investigated in an online survey with a within-subject design. Results show that customers prefer non-digitalized pharmacies for shopping and rate their risk as the lowest. Digitalized brick-and-mortar pharmacies are ranked in the same league as online pharmacies in terms of risk assessment. The purchase intention in digitalized brick-and-mortar pharmacies is nevertheless higher than in online pharmacies.

Keywords: Community Pharmacy – OTC Drug Presentation – Risk – Online Pharmacy – Digitalization Strategy

Funding:

No funding received.

INTRODUCTION

The fact that the retail sector is undergoing structural change can hardly be denied. Neither can the fact be denied that the internet plays an important role in this development. The market of pharmaceuticals is also experiencing changes (Fortune Business Insights 2019). Even though brick-and-mortar pharmacies (BMPs) in Germany still have the majority of market share in the sale of pharmaceuticals, they face strong competition from online pharmacies (OPs) (Tebroke 2019; Albrecht et al. 2020). In Germany, there are especially in the field of over-the-counter (OTC) drugs big changes. OPs have already achieved a market share of approx. 20 % in this area (ABDA – Bundesvereinigung Deutscher Apothekerverbände e. V. 2021).

The area of OTC drugs is a core competence in pharmaceutical consulting since customers can decide independently of physicians to buy or not because no prescription is needed. Also in this area, the consultation with pharmacists is a basis to create trust and loyalty in a BMP, which is a great advantage for BMPs (Wieringa et al. 2015; Sapic et al. 2019; Dölger 2021). Although generally, BMPs do not have to deal with customer adoption concerns, as is the case with OPs (Ma 2021; Sabbir et al. 2021), they must prepare for battle with OPs, since convenience aspects of OPs attract customers (Pramuk 2020).

Regarding OTC drugs, BMPs have to overcome some obstacles to sales because the German laws do not allow the self-service of customers. For this reason, OTC drugs are stored behind the sales counter and conventionally placed on shelves. These circumstances limit the presentation place and options, which makes it challenging for BMPs to offer the customers possibilities to browse through the OTC product assortment autonomously. In contrast, OPs are not limited in the product number and have nearly unlimited presentation options. In addition, they can easily present products that are not instantly available. Furthermore, customers can discover product properties completely autonomously and retrieve in many ways, such as graphics, text, and videos, information. The easy, all-time available and unlimited access to products and information is one of the main drivers of internet purchases (Beauchamp and Ponder 2010; Holtgräfe and Zentes 2012; Jiang et al. 2013). Facing these facts leads to the question: How can BMPs bring the advantages of the internet into the store to attract customers and protect their market share?

Technology has always been a key driver of change in the evolution of retailing (Hopping 2000), and in this case, there is little choice but to embrace digital technologies to remain competitive (Dekimpe et al. 2020).

Regarding in-store technologies that can enrich customers' in-store experience, BMPs can use Digital Signage Displays (DSD) to replace conventional shelves. A big advantage of using this technology, is among others, that products are always available for the customer, which means that shelves are always filled without products having to be in stock. Product availability is a central feature to trigger sales (e.g., Park and Kim 2003; Conlon and Mortimer 2013). Furthermore, on DSDs, products can be shown larger than in original package size, provided with information via texts, videos, graphics, and complementary products. In the best case, DSDs present medications in a self-explanatory manner, so that the presentation facilitates the reception and processing of products for purchase decisions (Kim and Lennon 2008). Adopting DSDs in the sales rooms of BMPs could make them more competitive.

Nevertheless, when purchasing medicines, the lacking knowledge of general customers about the high-risk good medicines (Santos 2021) can indicate a high awareness of taking risks (Ashford et al. 2000; Alwon et al. 2015). When medicines are purchased in environments that differ from conventional BMPs, such as seen in OPs and supermarkets (e.g., Yin et al. 2016; Mortimer et al. 2019), this can increase the perceived purchase risk.

Perceived purchase risk is a key concept in the marketing literature to understand customers' purchase intentions (Bauer 1960; Mitchell 1999; Ashford et al. 2000). It can be described as customers' inability to foresee the negative consequences of their purchase (Bauer 1960). Understanding the perceived risks from the consumer's perspective is an important criterion for determining whether the original intent to attract customers with DSDs and with that to compete with OPs, can be achieved.

Knowledge about the effects of DSDs in BMPs on customers is scarce. Only individual reports by pharmacists in relevant German pharmacy journals (e.g., Ditzel 2018a; Ditzel 2018b) and results of a field study in Germany exist (Ersöz and Schröder). In the mentioned study, named "Presenting OTC Drugs on Digital Signage Displays: Effects on the Perceived purchase Risk", we compared in a between-subject design customers' perceived risks after purchasing

OTC drugs from BMPs equipped with a DSD or a conventional Display (CD) in the sales rooms of five operating BMPs in Germany (Ersöz and Schröder). Because of some shortcomings due to the real-life situation in the study design, we are interested to overcome these by capturing the differences for BMPs with precisely predefined stimuli, to be pictures of presentation techniques, in an online survey with a within-subject design. Moreover, in this study, we investigate the perceived purchase risk between BMPs with a CD, BMPs with a DSD, and OPs. To our knowledge, there exists no comparative study that examined perceived purchase risks for OTC drug presentations between BMPs and OPs.

From a theoretical point of view, our contribution enriches by comparing the perception of certain risk types for the purchase of particular goods, to be OTC drugs, depending on pharmacies' shopping environments' digitalization level. Furthermore, we examine how the risk types influence perceived overall risk and estimate the impact on purchase intention via Structural Equation Modeling with the Partial-Least-Squares approach.

The remainder of this study is organized as follows: section 2 explains the theoretical background of the study and reports the state of research and describes the hypotheses. Section 3 explains the methods used in the study and section 4 presents the results. We discuss the findings, draw implications for practitioners in section 5, and lastly, present the conclusion in section 6.

PERCEIVED PURCHASE RISK IN SHOPPING MEDICINES

THEORETICAL CONCEPT[1]

Perceived purchase risk is a key concept for explaining consumer behavior in shopping situations (Mitchell 1999). It can be described as the perceived probability of a negative outcome due to a purchase decision, interpreted subjectively by the decision-maker (Bauer 1960; Cox and Rich 1964; Cunningham 1967). In shopping situations, negative consequences cannot be completely foreseen before purchasing a product, since there is always imperfect information. Customers cannot know all the possible negative consequences of the purchase prior to it, so they are exposed to uncertainty in the purchasing situation (Bauer 1960; Cunningham 1967). Customers can try to reduce their perceived shopping risks by retrieving information, e.g., on the right of return, guarantees, and quality seals, to carry out the purchase. If the perceived risk is above the personal threshold of the customer and cannot be reduced, the purchase will be abandoned (Bauer 1960).

The negative consequence of the purchase and its probability, i.e. uncertainty of occurrence, have emerged as the key features of perceived risk (Cunningham 1967; Mitchell 1999).

The risk perception is particularly significant in the pre-purchase situation when alternatives are evaluated in the background of making a purchase decision (Bauer 1960), on the one hand with regard to the products (Cunningham 1967; Derbaix 1983) and on the other hand with regard to the distribution channel (Hisrich et al. 1972). Arising from these differences, researchers mainly agree that perceived risk is a multidimensional construct (Derbaix 1983; Mitchell 1999). Early investigations show that overall risk can be defined by several risk types depending on product type, such as financial, performance, physical, psychological, and social risk (Jacoby and Kaplan 1972; Kaplan et al. 1974). Over time many new risk types have been added, such as time/convenience risk (Stone and Grønhaug 1993) and privacy/data risk (Smith et al. 1996; Lingenfelder 2001; Malhotra et al. 2004), which also consider the shopping channels. However, there are no universal definitions for the types of risk, so different names frequently appear but address the identical risk. Besides the problem that risk types are therefore not easily comparable across studies, they are also not necessarily unrelated among each other (e.g., Stone and Grønhaug 1993; Liljander et al. 2009).

Regarding the medicines purchase in BMPs and in OPs, which captures on the one hand a specific type of good that addresses naturally health risks, and on the other hand a purchasing environment with a specific product presentation type, both can arise the feeling of uncertainty and risk-taking. As well the goods and the environment can

[1] This chapter is a revised and advanced version of the publication "Ersöz, Semra/Schröder, Hendrik (2022). Presenting OTC Drugs on Digital Signage: Effects on the Perceived Purchase Risk. In: Manfred Bruhn/Karsten Hadwich (Eds.). Forum Dienstleistungsmanagement. Kundenperspektive – Mitarbeiterperspektive – Rechtsperspektive. Springer, 529–555."

be a barrier to the purchase. Following the study conducted in the sales rooms of BMPs (Ersöz and Schröder 2022), we define the relevant types of risk in Table 1.

TABLE 1: RISK TYPES WITH DEFINITIONS

Risk Type	Definition
Performance Risk	Wrong purchase decision due to the characteristics of the product presentation (adjusted from Jacoby and Kaplan 1972).
Physical Risk	Damage to health or discomfort caused by the product or the product presentation technique (Stone and Grønhaug 1993).
Psychological	Unsuitability of the product in comparison to the image or self-concept (Jacoby and Kaplan 1972).
Financial	Money loss due to the purchase (Cunningham 1967; Jacoby and Kaplan 1972).
Social	Rejection by others due to the choice of the shopping location (Stone and Grønhaug 1993).
Privacy	Disclosure of personal data to third parties (Malhotra et al. 2004).

LITERATURE REVIEW

Ample research has been conducted on relevant platforms such as EBSCOhost, Emerald Insight, ScienceDirect, SpringerLink, wiso, EconBiz and Scopus, Google Scholar, and Web of Science.

The first finding is that research on risks associated with medicines is predominantly concentrated on health issues; rarely customers' experiences during the purchase of medicines have been investigated.

For customer reactions to in-store DSDs existing research concentrates on the location of the displays, the type of advertising, the length of text messages, effects on retail atmospherics, and e.g., the given attention by customers (e.g., Burke 2009; Dennis et al. 2010; van de Sanden et al. 2020). These findings are hardly transferrable to the special case of pharmacies and drug presentations since the use of DSD, the type of retail, and the investigated topics are different.

Studies on perceived risk for medicine purchase address generic drugs (Rozano Suplet et al. 2009; Jharap 2017; Abzakh et al. 2013), health services (Ashford et al. 2000), and differences between the purchase in BMPs and supermarkets (Mortimer et al. 2019; Mortimer 2018). The findings of these studies are focused on relevant risk types that influence the shopping situation and purchase decision.

Regarding OPs, the effects of perceived risk on OP adoption have been studied in many other countries, predominantly using the Technology Acceptance Model and examining a few other constructs, such as trust, performance, usability, etc. (Büttner et al. 2006; Büttner and Göritz 2008; Yin et al. 2016; Ma 2021; Sabbir et al. 2021; Santos 2021). The results of the studies are not always clear-cut, with some concluding that perceived risk influences purchase intention (e.g., Yin et al. 2016), and others explaining mediator variables, such as trust, for the effect between perceived risk and purchase intention (e.g., Büttner and Göritz 2008; Ma 2021). Related studies are provided as an overview in Annex 1.

THE ROLE OF PERSONALITY TRAITS AND FAMILIARITY IN RISK PERCEPTION

Personality traits can be defined as relatively stable, consistent, and enduring internal characteristics derived from a pattern of a person's behaviors, attitudes, feelings, and habits (Allport 1937). According to Allport (1937), various traits exist to a varying degree in every individual and the unique decision process and behavioral tendencies are shaped by the interaction of these traits. There are different understandings of personality traits, but many scientists agree that they can be used to distinguish individuals from others (e.g., Brody and Cunningham 1968; Li 2017).

Against the background of risk, it is observable in daily life that people differ considerably in their risk assessments and decision-making in risky situations (Siegrist et al. 2005). The readiness to take risks in this context is a self-explanatory personality trait to understand why some people tend to encounter risky situations more than others, which can help to explain risk perception and behavioral intentions (Nicholson et al. 2005; Zuckerman 2007; Kam 2012).

Besides that, another personality trait to understand differences in risky decision-making between persons has shown to be the disposition to trust (e.g., Koller 1988; Sjöberg 2001; Siegrist et al. 2005). Some people tend to trust more than others, and the willingness to make oneself vulnerable to a third party, i.e., to rely on others, can be defined as interpersonal trust, which is included in the disposition to trust. (McKnight et al. 2004). In the early stages of a relationship, people generally rely on their disposition to trust, since they have little information by which to judge the other party (McKnight et al. 1998). However, this personality trait is not static but develops throughout life as people encounter other people and situations (Mayer et al. 1995).

This also highlights the role of familiarity with a person or situation as a parameter that can influence judgments and behavioral tendencies. Familiarity has the ability to directly influence risk perceptions and behavioral intentions (e.g., Koller 1988; Wang and Emurian 2005). This is also shown in the context of pharmacy adoption (e.g., Santos 2021; Mortimer et al. 2019).

In this study, we will use the explained personality traits and familiarity with the purchase situations as control variables to a) examine their impact on risk perceptions and purchase intention and b) adjust for these personality- and knowledge-based differences when comparing the three purchasing conditions.

HYPOTHESIS DEVELOPMENT

Reaching back to the situation of purchasing OTC drugs in pharmacies, we consider for the hypothesis development the characteristics of the pre-purchase situation for medicines in digital and non-digital environments.

During the evaluation of products, customers regularly consider the products' properties, functions, and usage in the background of their shopping goals. Evaluations are based on prior experiences and the perceived information in the shopping situation (Dowling 1986; Dowling and Staelin 1994). In the case of medicines, many properties can only be assessed after use, if at all. For this reason, medicines are to be regarded as intangible goods, particularly, in the pre-purchase phase (Benkenstein 2008).

General intangibility refers to the customer's difficulty in accurately describing and specifying a product (Laroche et al. 2004). It is shown that with increasing intangibility perceived purchase risks increase (Laroche et al. 2004; Nepomuceno et al. 2014). Mental intangibilities, which refer to cognitively perceivable characteristics, have been shown to have a stronger influence on perceived risks than physical intangibilities, which refer to characteristics perceivable by the bodily senses. Perceived risk can be lowered by increasing mental tangibility more than by increasing physical tangibility (Laroche et al. 2004). Interestingly, for the purchase of goods from the internet intangibility plays a minor role in perceived risk (Eggert 2006).

For the case of medicine purchase, we assume that intangibility pays in particular on performance, physical, and psychological risks, since these risk types address the risks that arise from perceived information and perceived product properties that also depend on the product presentation.

For performance risk, results of the investigation in BMPs show a lower risk perception in BMPs with a DSD compared to those with a CD (Ersöz and Schröder). This finding suggests that the absence of physical products could be compensated through the product's digital presentation.

Since in both environments, BMPs with a DSD and OPs, the products are presented as images, the difference between the pre-purchase situations is that in BMPs customers cannot interact with the presentations autonomously, they can retrieve only the presented information. In contrast, in OPs, they can interact with the product and retrieve easily more information. This may increase the mental tangibility of the products in OPs. Under these considerations, we hypothesize:

H1A: Customers perceive the *performance risk* to be *lower* when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in a BMP with a *CD*.

H1B: Customers perceive the *performance risk* to be *higher* when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in an *OP*.

Physical risk in shopping situations, when exploring the products with the eyes, can be described as occurring physical complaints, such as dizziness or eye pain. Ersöz and Schröder's study (2022) shows that perceived physical risk is lower in BMPs with a DSD than in BMPs with a CD. Furthermore, in OPs customers have more control over websites' settings, such as font and image size, and the number of products. They can reduce possible physical complaints autonomously. Subsequently, we hypothesize:

H2A: Customers perceive the *physical risk* to be *lower* when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in a BMP with a *CD*.

H2B: Customers perceive the *physical risk* to be *higher* when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in an *OP*.

Moving on with the psychological risk, which is associated with the concern to buy an unfitting product. The recognition of products thereby can highly depend on customers' prior experiences, expectations, and perceptions (Jayawardhena et al. 2007; Rains and Donnerstein Karmikel 2009; Laroche et al. 2005). However, studies have shown that the evaluation of products is not solely based on absolute levels or values of the properties, customers can also evaluate the discrepancy between the expectations for the product and the perceived attributes (Campbell and Goodstein 2001). Today, many customers are well used to online shopping environments and use them very frequently. When the psychological risk for BMPs with a DSD is evaluated regarding the presentation's similarities with OPs, we suggest that BMPs with a DSD are perceived as indifferent in psychological risk compared to OPs, but according to Ersöz and Schröder's findings (2022) less risky compared to BMPs that have CDs.

H3A: Customers perceive the *psychological risk* to be *lower* when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in a BMP with a *CD*.

H3B: Customers perceive the *psychological risk* to be *equal* when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in an *OP*.

Price consciousness is an essential factor in decision-making (Ju and Lee 2017), and pharmacy customers are interested in buying lower-cost OTC drugs with the same medical effect (Ricks and Mardanov 2012). The possibility to compare prices is on the internet even higher than in retail, this can decrease perceived financial risk (Bezes 2016). Furthermore, OPs are known for their cheap prices (Wieringa et al. 2015; Tebroke 2019). When purchasing medications in BMPs with CDs compared to those with DSDs, customers do not have to expect BMPs to lower or raise prices quickly as products usually have price tags and this would be labor-intensive. In contrast, prices on DSDs can be changed in a short time. Consequently, we assume:

H4A: Customers perceive the *financial risk* to be higher when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in a BMP with a *CD*.

H4B: Customers perceive the *financial risk* to be higher when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in an *OP*.

When purchasing medicines in BMPs, customers can identify themselves with the BMP's values and traditions. The change from shopping in traditional BMPs to modern digitalized BMPs can mean that customers identify with this quite new store image and therefore make their purchases there. Depending on the values of their social groups, these may or may not approve of the change (e.g., Escalas and Bettman 2005; Woodruffe-Burton and Wakenshaw 2011; He et al. 2012). In the case of buying medicines in supermarkets, the social risk was heightened (Mortimer et al. 2019). Studies for online shopping show contrary results, social risk is perceived to be lower than in physical stores (Eggert 2006). Therefore, we assume:

H5A: Customers perceive the social risk to be higher when purchasing OTC medicines in a BMP with a *DSD*compared to purchasing in a BMP with a *CD*.

H5B: Customers perceive the social risk to be higher when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in an *OP*.

In BMPs the magnified product presentation by the DSD can enable other customers to see more clearly the products on which another customer is advised and also which products they buy. Consequently, personal data is more likely to be passed on to other customers than in the case of consultation in front of a CD. The customer who is advised in a pharmacy with a DSD can be unsure whether and to what extent their state of health is accessible to other customers in the sales room. Considering online shopping, the privacy risk is known to be of great significance for customers (e.g., Miyazaki and Fernandez 2001). Compared to shopping in retail stores, customers are more concerned that third parties can get easily access their personal data (Eggert 2006). Therefore, we hypothesize:

H6A: Customers perceive the privacy risk to be higher when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in a BMP with a *CD*.

H6B: Customers perceive the privacy risk to be lower when purchasing OTC drugs in a BMP with a *DSD* compared to purchasing in an *OP.*

Moreover, we assume that the selected risk types form the overall perceived risk for shopping for OTC medication in digitalized and non-digitalized pharmacies, therefore we hypothesize for all three presentation types:

H7: Performance, psychological, physical, privacy, financial, and social risk types will significantly contribute to the perceived overall risk.

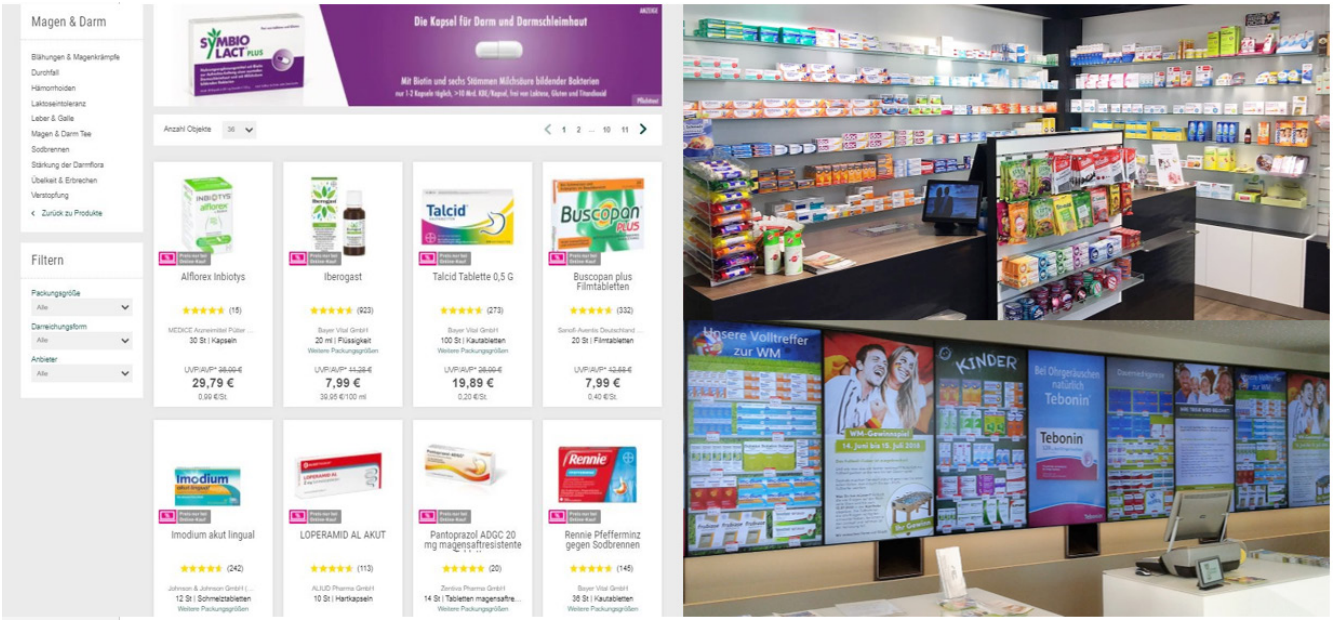
Referring to the concept of perceived purchase risk (Bauer 1960), which states that perceived risk can lead to the cancelation of the purchase process, we assume that perceived purchase risk can lower the purchase intention. This is why we place the following hypothesis for all three purchase conditions:

H8: The greater the *overall risk* the lower the *purchase intention*.

METHOD

STIMULI AND STUDY DESIGN

In an online survey, designed as a within-subjects design, three types of pharmacies to be a BMP with conventional displays, a BMP with digital signage displays, and an online pharmacy website, were investigated regarding customers' perceived risk for the defined risk types (see Chapter 2.1). The perceived risk scale was adapted from (Ersöz and Schröder 2022). We introduced the survey with "Imagine you want to purchase a non-prescription drug from the pharmacy section shown" and showed one of the pharmacy images to be evaluated (see Figure 1). The statements were asked twice, once for uncertainty ("How likely do you think it is that the consequences listed here will occur?") and once for negative purchase effect ("How annoying do you consider then the occurrence of the consequences listed here?"). The statements were fully randomized for each presentation type within the uncertainty and negative effect ratings and the sequence of uncertainty and negative effect evaluations. Additionally, we questioned participants' perceived overall risk, purchase intention, purchase behavior, and demographics. Further, the control variables, interpersonal trust (Beierlein et al. 2014), readiness to take risks (adapted to the pharmacy context from Beierlein et al. 2015), and familiarity with pharmacies (BMPs in general, BMPs with DSD, OPs) have been surveyed. All scales were assessed on a 7-point scale, except the purchase behavior and demographics. The OR was questioned with a global item for each condition with "Overall, I consider the risk of purchasing non-prescription drugs to be…" to be answered on a 7-point scale with 1 = very low, 2 = low, 4 = moderate, 6 = high, and 7 = very high.



(Note: from left to right: OP (Source: www.Docmorris.de), right on top: BMP with a CD (Source: own photos), right at the bottom: BMP with a DSD (Source: own photos))

FIG. 1: IMAGES OF PHARMACIES

SAMPLE

219 German-speaking participants were recruited through link sharing on social media platforms (Facebook, Instagram) to fill out the online survey. Convenience sampling was used to select the participants, which is an efficient and acceptable sampling method to adopt for online shopping, as demonstrated in previous studies (e.g., Park and Kim 2003; Carlson and O'Cass 2010; Kumar et al. 2020). The study took place in August and September 2021. 219 subjects participated, 87 of the data sets needed to be filtered out because participants either did not complete the survey or did not answer the attention check correctly (which was a statement hidden somewhere between the scales in which they were asked to click "4"). As a result, a final sample size of n = 132 participants is included for further data analyses. Thus, for the three presentation manipulations, we had a total of 396 valid responses. Average age was M = 27.5 years (SD = 8.39 years, Min = 16, Max = 61). Gender distribution was not entirely balanced, with 68% of participants being female (30% male and 2% non-binary).

Most of the participants were students (66%), followed by a smaller amount being employed (29%), self-employed (2%), other (2%), such as parental leave, and one participant was retired (1%). The majority of the participants were single (80%), followed by married (18%), other (2%), and divorced (1%). Most of the participants had a monthly net income of fewer than 1000 Euros (56%), a much smaller group of around 2000 Euros (23%), followed by around 2500 Euros (12%). For a more detailed overview of the demographic data, see Table 3.

The interpersonal trust towards pharmacies was rated above the scale's average with M = 3.72 (SD = .63), while the readiness to take risks was slightly below the scale's average M = 2.85 (SD = 1.47). Familiarity with BMPs in general was pretty high with M = 5.50 (SD = 1.59) in contrast to BMPS with a DSD M = 3.02 (SD = 2.25) rated as moderate, and online pharmacies with M = 3.43 (SD = 2.08) rated slightly above scales average.

TABLE 3: DEMOGRAPHICS AND PURCHASE BEHAVIOR OF THE SAMPLE

	n	%
Gender		
female	90	68
male	40	30
non-binary	2	2
Marital Status		
single	105	80
married	23	18
divorced	1	1
other	2	2
Highest educational level		
no degree	1	1
Middle School or Apprenticeship	15	11
High school or College	41	31
University/Postgraduate degree	75	57
Employment		
Student	86	66
Employed	38	29
Self-Employed	3	2
Retired	1	1
other	3	2
Income (net monthly)		
< 1000 EUR	65	56
~ 2000 EUR	27	23
~ 2500 EUR	14	12
~ 3000 EUR	7	6
> 3500 EUR	3	3
Age		
16 - 25	73	56
26 - 39	45	34
40 - 55	9	7
> 55	4	3
Purchase Behavior		
Frequency of Shopping in BMPs		
not at all	8	6
infrequent	21	16
1-2 times in a year	40	30
every 3 months	55	42
several times per month	8	6
Frequency of Visits in BMPs (e.g., to obtain information)		
not at all	35	26
infrequent	50	38
1-2 times in a year	27	21
every 3 months	16	12
several times per month	4	3

	n	%
Frequency of Shopping in OPs		
not at all	58	44
infrequent	32	24
1-2 times in a year	28	21
every 3 months	14	11
several times per month	0	0
Frequency of Use of OPs (e.g., to obtain information)		
not at all	49	37
infrequent	33	25
1-2 times in a year	27	21
every 3 months	21	16
several times per month	2	1

DATA PRE-PROCESSING[2]

The two components of the perceived risk construct (uncertainty and negative purchase effect) have to be linked to estimate the perceived risk. Two methods exist to achieve this: the summative and the multiplicative linking (Mitchell 1999). We decided to use the latter because it follows the principle of diminishing sensitivity. According to this central principle of Kahnemann and Tversky's Prospect Theory (1979), the relative increase in probability is more meaningful than the absolute increase (Kahneman and Tversky 1979). To exemplify, an increase of 1 to 2 % looms larger than an increase from 11 to 12 %. Using the summative linking instead of this logarithmic model would therefore imply disregarding well-established scientific knowledge and common sense (Wolff et al. 2019).

$$RI_i = \sum_{n=1}^{l} U_{ip} \times P_{ip}$$

RI = Perceived Risk of Statement i

U = Uncertainty of Purchase Effect

P = Negative Purchase Effect

n = Person (1, ..., l)

FIG. 2: ESTIMATION MODEL FOR PERCEIVED RISK PER STATEMENT

Furthermore, the statements were aggregated according to their assigned risk type, to estimate the risk types and their extent of perceived risk.

$$RA_j = \left(\sum_{i=1}^{m} RI_i \right) \div M_j$$

j = Risk type

RA_j = Perceived Risk of j

M_j = Number of Statements belonging to j

RI = Perceived Risk of Statement i

FIG. 3: ESTIMATION OF PERCEIVED RISK PER RISK TYPE

2 This chapter is a revised and advanced version of the publication "Ersöz, Semra/Schröder, Hendrik (2022). Presenting OTC Drugs on Digital Signage: Effects on the Perceived Purchase Risk. In: Manfred Bruhn/Karsten Hadwich (Eds.). Forum Dienstleistungsmanagement. Kundenperspektive – Mitarbeiterperspektive – Rechtsperspektive. Springer, 529–555."

To demonstrate the case of no risk, the values for the answers 1 to 7 were rescaled to 0 to 6 before we processed the data as above. If one of the two values for the uncertainty or the negative purchase effect is then rated “0”, there is no perceived purchase risk. For all other cases, risk levels 1 to 5 were formed, respectively the upper limits of risk levels to be the squares of the values from 2 to 6 (table 2).

TABLE 2: DEFINITION OF RISK LEVELS

Risk Values	0	> 0 - 4	> 4 - 9	> 9 - 16	>16 - 25	>25 - 36
Risk Level	0 no risk	1 very low risk	2 low risk	3 moderate risk	4 high risk	5 very high risk

RESULTS

HYPOTHESES TESTING

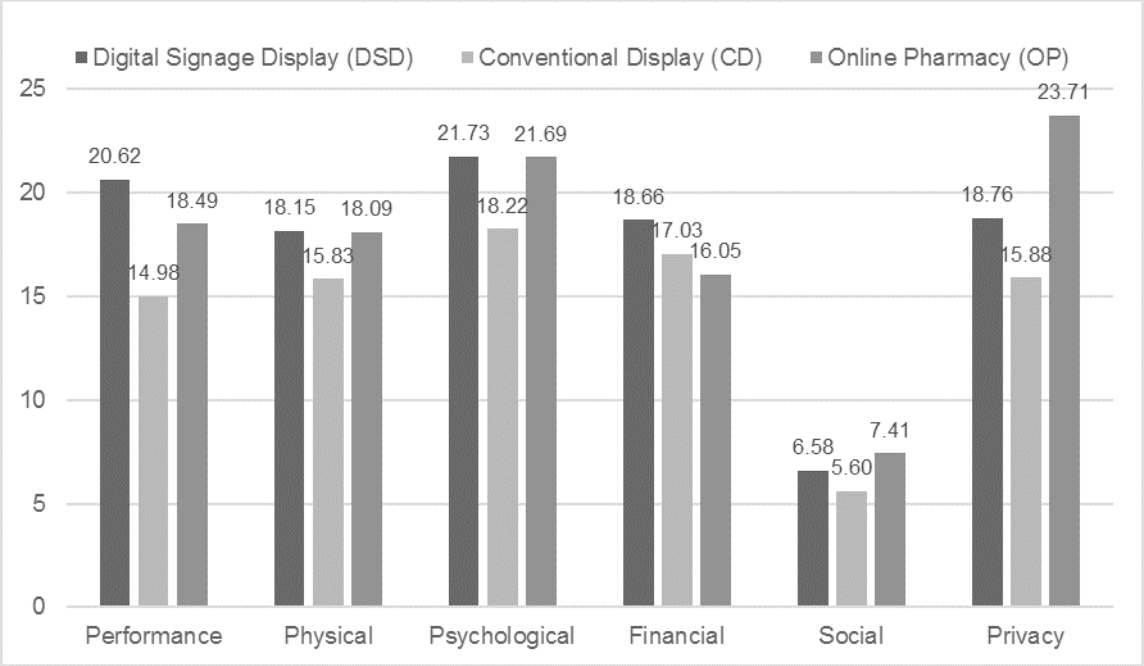
Hypotheses 1 - 6

We analyzed the data for differences between presentation types by controlling for the personal traits, as well the familiarities via repeated measures Analysis of Covariance (rmANCOVA). The assumptions for ANCOVA (normality, homogeneity of variance, and random independent samples) were checked and met by the data.

TABLE 4: RESULTS OF rmANCOVA (Note: Significance levels *p < .05; **p < .001)

Risk type	**Main Effects**	
	F (2, 125)	**η^2**
Performance	19.12**	0.234
Physical	7.50**	0.107
Psychological	15.19**	0.196
Financial	5.64*	0.083
Social	3.97*	0.060
Privacy	27.87**	0.308

The first analysis results show significant differences through all risk types to be evident in the three compared conditions (Table 4). The effect size η^2 can be interpreted as η^2 = .01 small, η^2 = .06 medium, and η^2 = .14 large effect, based on Cohen’s thresholds (Cohen 1988).



(Note: Values > 4 and ≤ 9 stand for "low risk", values > 9 and ≤ 16 stand for "moderate risk", and values > 16 and ≤ 25 stand for "high risk")

FIG. 4: MEAN VALUES (ADJUSTED WITH CONTROL VARIABLES) OF PERCEIVED RISK PER RISK TYPE FOR BMPS WITH A DSD AND A CD AND OPS (STUDY 2)

To reveal the differences between the purchase conditions, i.e. presentation types, we conducted post hoc tests with Sidak adjusting. The mean values are controlled for biases by adjusting with control variables as covariates. An overview of the adjusted mean values shows Figure 4.

For **performance risk**, there is a difference between BMPs with a DSD and BMPs with a CD ($p < 0.001$). The difference indicates a higher perception of performance risk for BMPs with a DSD ($M = 20.62$, $SD = 10.81$) perceived at a high level compared to BMPs with a CD ($M = 14.98$, $SD = 8.73$), perceived at a moderate level. This result rejects Hypothesis H_{1A}. Hypothesis H_{1B} is also rejected because no significant differences were detected between BMPs with a DSD and OPs. Analyzing the covariates' effects (see Table 6), we can report a relevance for BMPs with a DSD of *familiarity with BMPs* with an increasing effect ($\beta = 1.78$, $p = .007$), and *familiarity with OPs* with a decreasing effect ($\beta = -0.997$, $p = 0.039$) on the perceived performance risk. For OPs, *interpersonal trust* has an increasing effect ($\beta = 2.05$, $p = .008$), and *familiarity with OPs* has a decreasing effect on performance risk perception ($\beta = -0.872$, $p = .045$).

In **physical risk perception**, the results show solely a difference for BMPs with a DSD compared to those with a CD ($p < .001$), to be higher for BMPs with a DSD. The physical risk was perceived at a high level for BMPs with a DSD ($M = 18.15$, $SD = 9.25$) and at a moderate level for those with a CD ($M = 15.83$, $SD = 8.73$). Hypotheses H_{2A} and H_{2B} have to be rejected.

The covariate *interpersonal trust* shows significant effects on this risk type. It decreases the physical risk perception in BMPs with a CD ($\beta = -1.57$, $p = .015$).

Comparing **psychological risk** for the three conditions reveals also solely a difference between BMPs with a DSD and BMPs with a CD ($p < .001$). For this risk type, the perception was higher for BMPs with a DSD ($M = 21.73$, $SD = 9.98$) than for those with a CD ($M = 18.22$, $SD = 9.06$) within a high-risk level. This result rejects hypothesis H_{3A} but supports Hypotheses H_{3B} since there is no significant difference between BMPs with a DSD and OPs.

As relevant covariate *familiarity with BMPs* is identified with an increasing effect for the purchase in BMPs with a DSD ($\beta = 1.473$, $p = .016$) and the purchase in OPs ($\beta = 1.539$, $p = .010$).

For **financial risk**, there are differences between BMPs with a DSD and those with a CD (p = .049), and OPs (p = .007) as well. The financial risk is perceived for all conditions at a high level with M = 18.66 (SD = 8.99) for BMPs with a DSD, M = 17.03 (SD = 8.47) for those with a CD, and M = 16.05 (SD = 9.26) for OPs, but highest for BMPs with a DSD (see Figure 4). These outcomes support our hypotheses H_{4A} and H_{4B}.

For this risk type, the *readiness to take risks* as a control variable shows significant positive effects for the purchase in BMPs with a DSD (β = 1.37, p = .011), likewise, *familiarity with BMPs* has an increasing effect on OPs (β = 1.39, p = .012).

Testing for differences in **social risk** perception results in no differences in the comparison of BMPs with a DSD vs. BMPs with CD, and vs. OPs. The social risk is perceived on a low level for all conditions: M = 6.58 (SD = 6.86) for BMPs with a DSD, M = 5.60 (SD = 7.86) for those with a CD, and M = 7.41 (SD = 8.84) for OPs. The significant main effect of the ANCOVA is due to significant differences between BMPs with a CD and OPs (p = .036). Hypotheses H_{5A} and H_{5B} are rejected.

The analyses of covariates show that *readiness to take risks* increases the social risk perception when purchasing in BMPs with a DSD (β = 1.02, p = .014), with a CD (β = 1.12, p = .015), and in OPs (β = 1.35, p = .013). In contrast, *interpersonal trust* has a decreasing effect on the purchase in BMPs with a CD (β = -1.46, p = .014) while *Familiarity with BMPs* shows decreasing effects in BMPs with a DSD (β = -1.04, p = .003) and in those with a CD (β = -1.04, p = .011) for social risk perception.

At least, for **privacy risk**, the post hoc test reveals differences for BMPs with a DSD compared to those with a CD (p < .001) and also compared to OPs (p < .001). The privacy risk is perceived at high levels in OPs (M = 23.71, SD = 12.61) and in BMPs with a DSD (M = 18.76, SD = 11.03). In BMPs with a CD, the perceived privacy risk is at a moderate level (M = 15.88, SD = 10.36). The privacy risk is perceived as higher in BMPs with a DSD than in those with a CD, but highest in OPs. These results support our hypotheses H_{6A} and H_{6B}.

Relevant effects are detected for the control variable *familiarity with OPs* when purchasing in OPs (β = -1.62, p = .004) with a decreasing effect and for *familiarity with BMPs* (β = 1.98, p = .009) with a risk perception increasing effect.

TABLE 5: HYPOTHESES 1 - 6 TESTS RESULTS

Risk type	Hypothesis DSD vs. CD			Hypothesis DSD vs. OP		
	Direction		Result	Direction		Result
Performance	H1A	DSD < CD	x	H1B	DSD > OP	x
Physical	H2A	DSD < CD	x	H2B	DSD > OP	x
Psychological	H3A	DSD < CD	x	H3B	DSD = OP	✓
Financial	H4A	DSD > CD	✓	H4B	DSD > OP	✓
Social	H5A	DSD > CD	x	H5B	DSD > OP	x
Privacy	H6A	DSD > CD	✓	H6B	DSD < OP	✓

TABLE 6: SIGNIFICANT EFFECTS OF THE CONTROL VARIABLES ON THE RISK TYPES

Risk Type / Control Variable	Performance			Physical			Psychological			Financial			Social			Privacy		
	DSD	CD	OP	DSD	CD	OP	DSD	CD	OP	DSD	CD	OP	DSD	CD	OP	DSD	CD	OP
Readiness to take risks													↑	↑	↑			
Interpersonal trust			↑		↓					↑				↓				
Familiarity with BMPs in general	↑						↑		↑			↑	↓	↓				↑
Familiarity with BMPs with a DSD																		
Familiarity with OPs	↓		↓															↓

(Note: ↑ symbols a positive effect, ↓ symbols a negative effect; significance level of 0.05)

Hypotheses 7 and 8

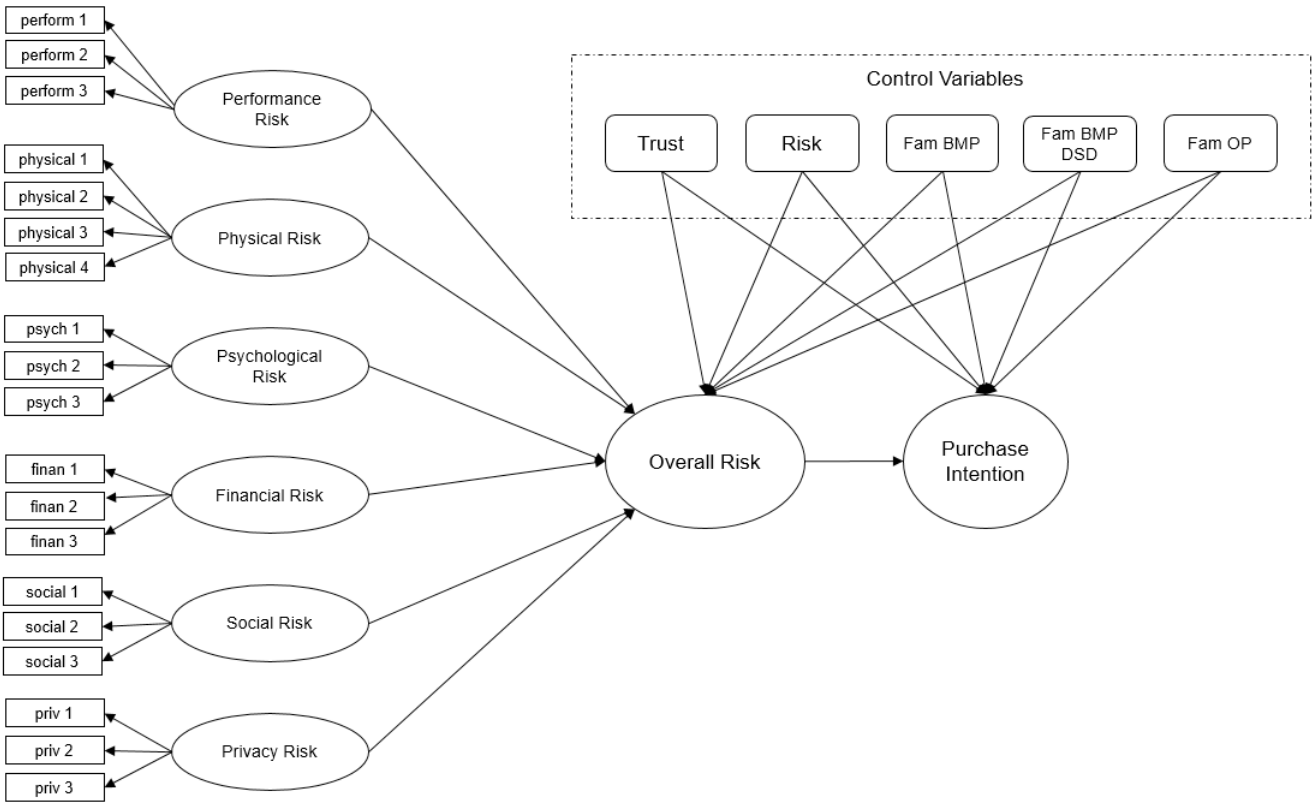
Having tested the differences between presentation types, we are further interested in testing Hypothesis 7 about the contribution of the risk types on overall perceived risk (OR) and hypothesis 8 about ORs influence on purchase intention (PI).

For this purpose, we use Partial Least Squares Structural Equation Modeling (PLS-SEM), which is a variance-based path modeling, since this method is more suitable for early-stage research and can deal with hierarchical models as it is in the case of risk types and overall risk (Hair et al. 2018) compared to the widely used Covariance Based Structural Equation Modeling (CB-SEM). The difference between the two methods is that covariance-based estimators minimize the discrepancy between the empirical and model-implied variance-covariance matrix of the observable indicators to estimate the model parameters, whereas variance-based estimators estimate linear combinations of the indicators as proxies for the theoretical concepts (Benitez et al. 2020).

Our research model (see Figure 5) is built from reflective measurements for the risk types, the PI, and the control variables. The risk types are meant to formatively form the OR (hypothesis 7). They can be regarded as ingredients from which OR is built, which influences PI (hypothesis 8). The model's estimation was computed for each purchase condition.

First, we computed the PLS algorithm and subsequently applied the bootstrap method to estimate the relationships among constructs. PLS-SEM estimates reflective measurement models with Mode A (correlations weights). To estimate the algorithm estimation, the following parameters were set: 300 iterations, stop criterion 10-7, and replacing the missing values with the average values. To test the significance of the path coefficients, the bias-corrected and accelerated (BCa) bootstrapping procedure was applied with 5000 samples and a two-tailed significance level of 0.05 (Hair et al., 2017).

The analysis of PLS-SEM is carried out in two stages, where the first stage includes the ascertainment of the used measures in terms of reliability and validity as preconditions to estimate the models. Then, in the second stage, the resultant model coefficients are interpreted.



(Abbr.: Trust = Interpersonal trust; Risk = Readiness to take risks; Fam = Familiarity)

FIG. 5: RESEARCH MODEL

Testing Preconditions

First, we assessed the *measurement models*.

Reflective measurement models require the estimation of the following quality criteria: composite reliability (Dijkstra–Henseler's ρ), discriminant validity via heterotrait-monotrait correlation ratio (HTMT), the average variance extracted (AVE), and factor loadings of the items.

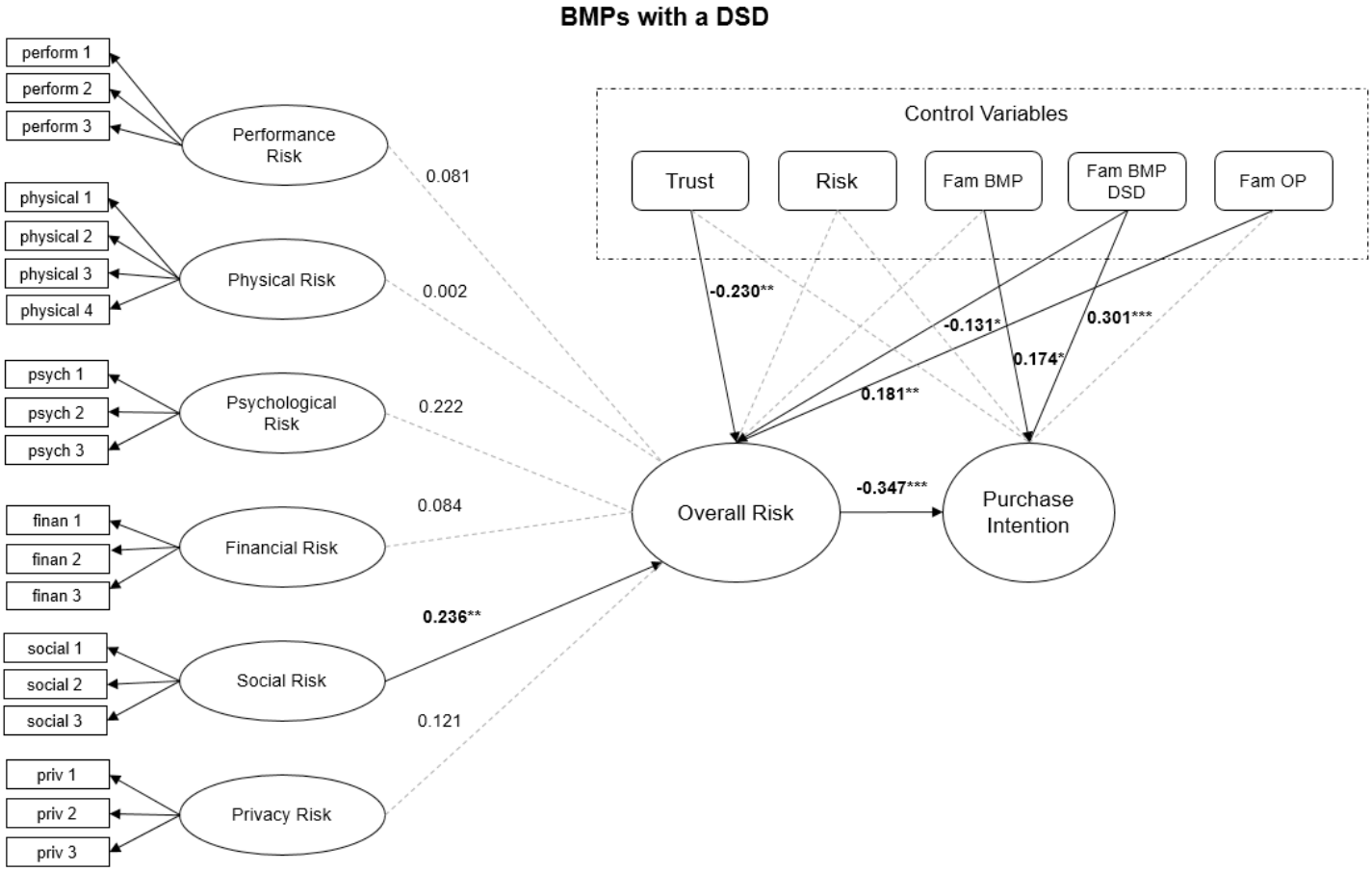
For composite reliability, Dijkstra–Henseler's ρ, which depicts the correlation between the latent variable and construct scores, larger than 0.707 was regarded as reasonable (Nunnally 1994). This value describes in addition to Cronbach's α the internal consistency of the constructs. Discriminant validity means that two latent variables that are theoretically meant to be different, differ also statistically sufficiently. If the HTMT value is below 0.90, discriminant validity has been established between two reflective constructs (Hair et al. 2017). The AVE, typically used to assess convergent validity, indicates to what extent the latent variable can explain the indicators' variance. An AVE larger than 0.5, has been suggested (Hair et al., 2017). Factor loadings indicate an indicator's reliability and should be greater than 0.707, interpreted as more than 50% of the variance in a single indicator can be explained by the corresponding latent variable (Hair et al. 2017).

The measurement model estimations meet the criteria Dijkstra–Henseler's $\rho > 0.707$, HTMT < 0.9, and AVE >0.5 completely. The loadings of two items of financial risk (finance 2 and 3) in the model for BMPs with a CD are slightly below the threshold of 0.707. Since both items meet the criteria in the other two estimated models for BMPS with a DSD and OPs, we see no reason to take steps.

Regarding the model-fit measures for PLS-SEM, so far, there is no suitable measure for overall fit (Benitez et al. 2020; Hair et al. 2019; Henseler et al. 2016).

Testing Hypotheses

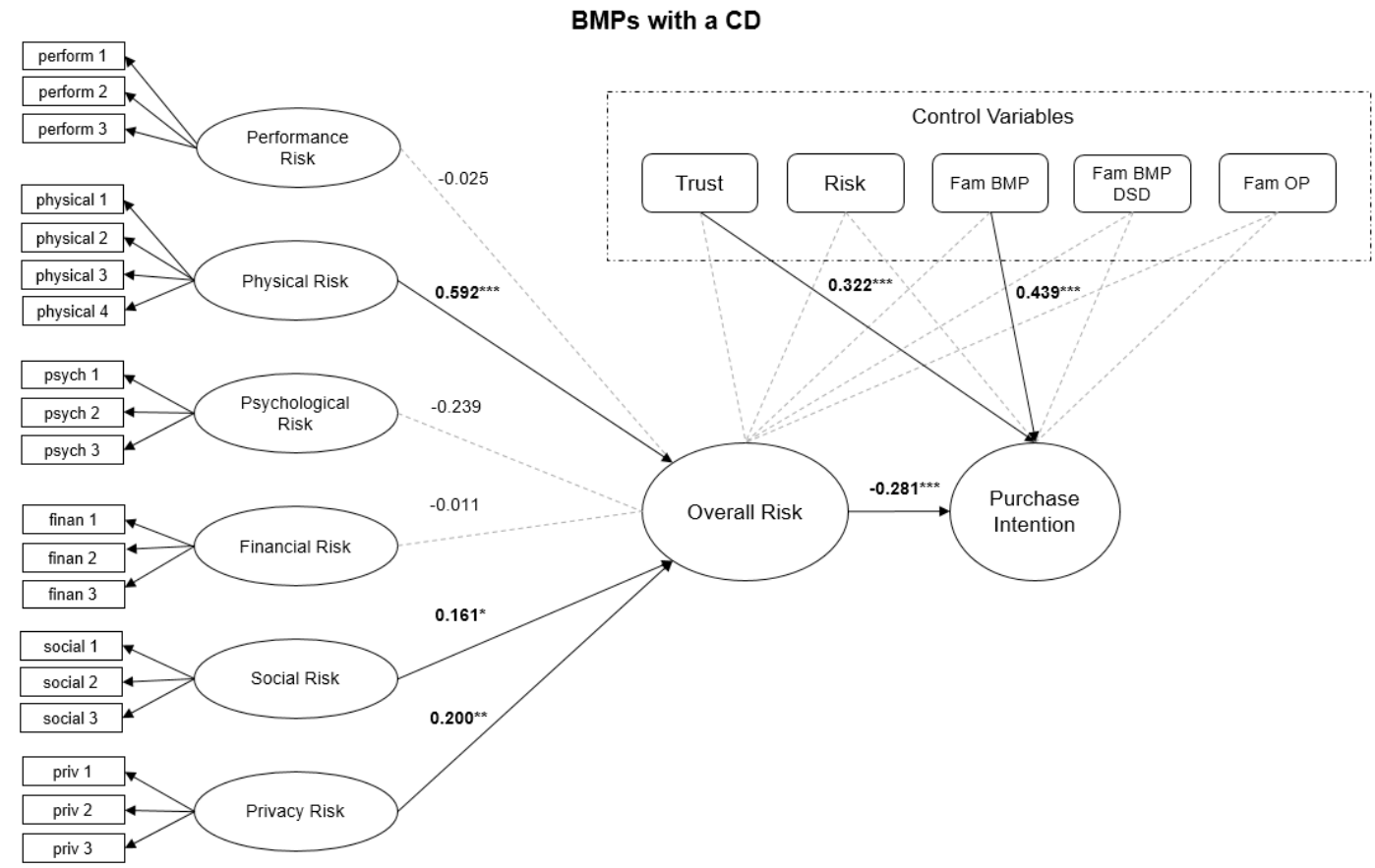
Second, to test the hypotheses, we computed the *structural models.*



(Note: Significance levels *p < .10, **p < .05; ***p < .001, insignificant paths are dashed lines)

FIG. 6: RESULTS OF SEM FOR BMPS WITH A DSD

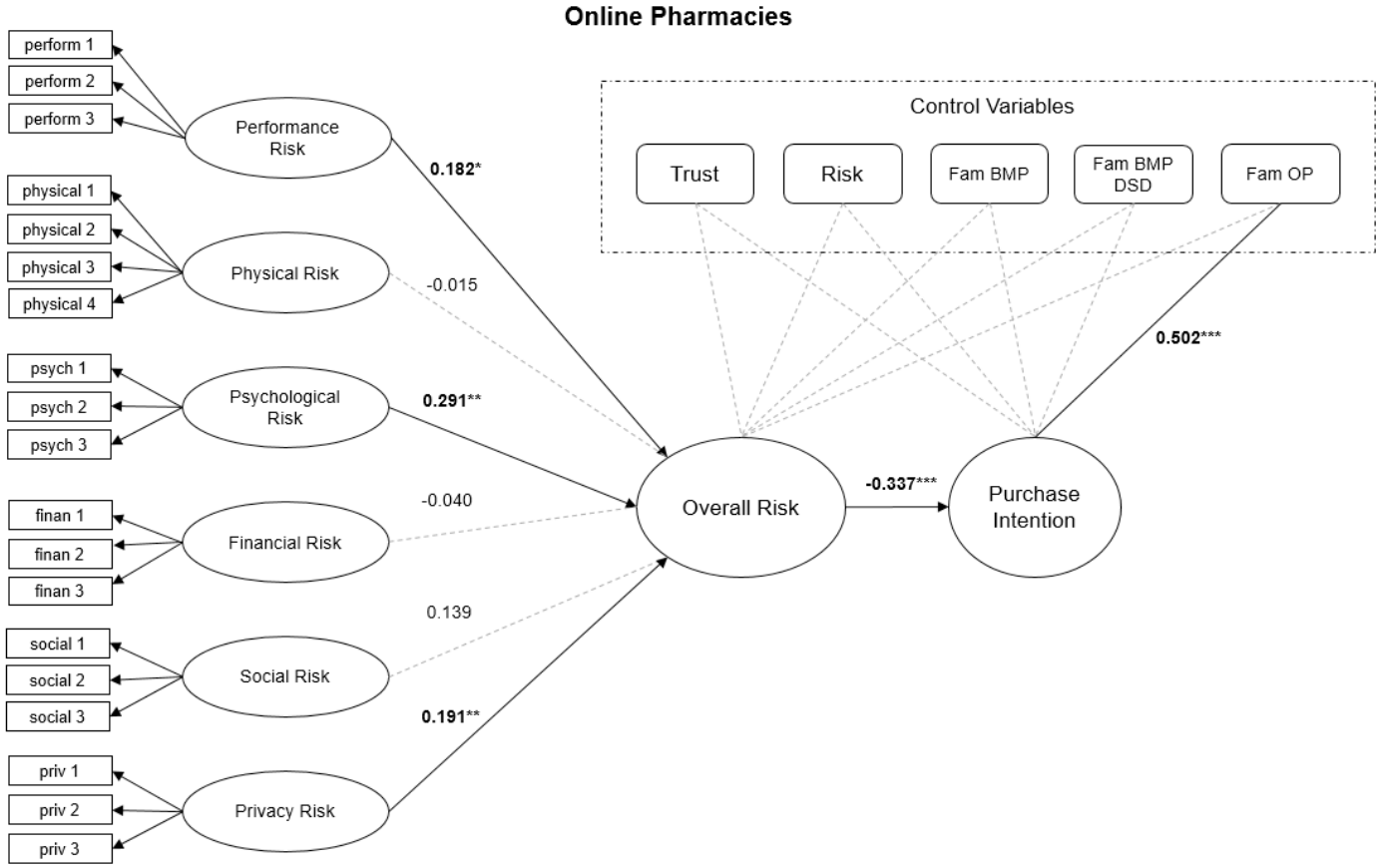
The estimated model for **BMPs with a DSD** shows a significantly positive relation between social risk and OR (f^2 = .061), and a significantly negative relation between OR and PI (f^2 = .147) (see Figure 6). Interpersonal trust has a negative effect on OR (f^2 = .068), as has familiarity with BMPs equipped with DSDs (f^2 = .024). In contrast, familiarity with OPs has a positive effect on OR (f^2 = .044). Familiarity with BMPs in general (f^2 = .034) and with those with DSDs (f^2 = .121) have a positive effect on PI. The f^2 values range from 0.02 to 0.149, 0.150 to 0.349, or larger or equal to 0.350, indicating weak, medium, or large effect size respectively (Cohen 1988). The degrees of variance as R^2 values for OR and PI are also calculated and result in R^2 = .386 (corrected R^2 = .329) for OR and in R^2 = .303 (corrected R^2 = .269) for PI.



(Note: Significance levels *p < .10, **p < .05; ***p < .001, insignificant paths are dashed lines)

FIG. 7: RESULTS OF SEM FOR BMPS WITH A CD

For **BMPs with a CD**, physical (f^2 = .152), social (f^2 = .035), and privacy (f^2 = .052) risk types are found significantly positively related to OR. OR is significantly negatively related to PI (f^2 = .140). The personality trait of interpersonal trust has a positive effect on PI (f^2 = .169), as has familiarity with BMPs (f^2 = .303), see Figure 7. R^2 values result in R^2 = .370 (corrected R^2 = .312) for OR, and R^2 = .497 (corrected R^2 = .473) for PI.



(Note: Significance levels *p < .10, **p < .05; ***p < .001, insignificant paths are dashed lines)

FIG. 8: RESULTS OF SEM FOR OPS

The results for **OPs** show significant positive relations between performance (f^2 = .029), psychological (f^2 = .040), and privacy (f^2 = .039) risk types and OR. As well, OR is significantly negatively related to PI (f^2 = .180). Familiarity with OPs has a positive impact on PI (f^2 = .379), see Figure 8. OR results in R^2 = .299 (corrected R^2 = .235) and PI in R^2 = .426 (corrected R^2 = .398).

From these results, it can be concluded that **hypothesis 7** has to be rejected because for each model tested, and thus each purchase condition, only some but not all risk types contribute to the OR.

Hypothesis 8, which states that the greater OR the lower PI, is supported by our estimated models for all three purchase conditions.

FURTHER ANALYSES

TABLE 7: PURCHASE INTENTION AND OVERALL RISK MEAN VALUES AND STANDARD DEVIATION (IN BRACKETS)

	DSD	CD	OP
OR	17.42 (6.67)	14.86 (5.99)	17.57 (6.48)
PI	4.94 (1.76)	6.17 (1.25)	4.55 (1.51)

(Note: For OR values > 9 and ≤ 16 stand for “moderate risk”, and values > 16 and ≤ 25 stand for “high risk”; for PI value 1 stands for “I disagree”, 4 stands for “moderately”, and 7 for “I fully agree”)

Furthermore, we are also interested in the magnitudes of PI and OR to gain a comparative perspective of customers' ratings on OR and PI. We, therefore, computed the mean values (see Table 7) and conducted rmANCOVAs with controlling for the consistently used control variables. The rmANCOVAs confirm significant differences in the OR, $F(2.125) = 26.62$, $p < .001$. $\eta^2 = .299$, and in the PI, $F(2.125) = 102.10$. $p < .001$. $\eta^2 = .620$ between the purchase conditions. The OR is rated at a high-risk level for BMPs with a DSD and OPs. BMPs with a CD were perceived as moderately risky. Post-hoc testing with Sidak adjusting signifies that for the purchase in BMPs with a DSD compared to those with a CD perceived OR is higher ($p < .001$). For PI between all conditions, the differences are found to be significant on a level of $p < .05$. The PI is highest for BMPs with CDs, followed by BMPs with a DSD, and lowest for OPs.

Furthermore, we analyzed how far the OR perception is associated with the PI among the three conditions by estimating Pearson's correlations. The PI in BMPs with a CD is positively correlated with the perceived OR in OPs ($r = .224$, $p = .01$).

DISCUSSION

SUMMARY OF THE MAIN FINDINGS

Given the study objective, we first developed hypotheses about product presentations for the three stages of pharmacy digitalization to compare perceived risk types in digitalized BMPs with a DSD with non-digitalized BMPs with a CD and with fully digitalized pharmacies, the OPs. To this end, we took a closer look at the type of products that are allowed to be presented in this sales area, defined as OTC drugs, and the product presentations' characteristics in the purchase conditions.

TABLE 8: OVERVIEW OF THE RESULTS

Tested Variable	Results DSD		Risk Levels		
			CD	OP	
Performance Risk	DSD > CD	DSD = OP	high	moderate	high
Physical Risk	DSD > CD	DSD = OP	high	moderate	high
Psychological Risk	DSD > CD	DSD = OP	high	high	high
Financial Risk	DSD > CD	DSD > OP	high	high	high
Social Risk	DSD = CD	DSD = OP	low	low	low
Privacy Risk	DSD > CD	DSD < OP	high	moderate	high
Overall Risk	DSD > CD	DSD = OP	high	moderate	high
Purchase Intention	DSD < CD	DSD > OP	-	-	-

The results revealed that in each purchase condition customers perceive each risk type (see Table 8, Risk Levels). For the digitalized pharmacies, to be 1) BMPs with a DSD and 2) OPs, the risk types performance, physical, psychological, financial, and privacy are perceived at high levels. The perceived overall risk is also considered high for both conditions. For non-digitalized BMPs with a CD, performance, physical, and privacy risks are perceived at a moderate level, whereas psychological and financial risks are perceived at a high level. For this purchase condition, the overall risk is classified as moderate. The social risk is perceived in all conditions at a low level.

The difference testing revealed significant differences in nearly every risk type between BMPs with a DSD and those with a CD (see Table 8, Results). Except for social risk, which is not perceived differently between the compared conditions, BMPs with a DSD score significantly higher on all risk types than BMPs with a CD. In terms of risks related

to performance, physical health, and privacy, differences in OTC drug purchases are rated one risk level higher for BMPs with DSD than for BMPs with CD. Thus, our hypotheses for financial and privacy risks are supported by these findings.

In the comparison between BMPs with a DSD and OPs are significant differences found for financial risk, to be higher in BMPs with a DSD than in OPs, and for privacy risk, to be lower in BMPs with a DSD than in OPs. All in all, the types of risk are perceived at the same level in both conditions, which is generally high, except for social risk, which is low. The hypotheses established could be upheld for the risk types psychological, financial, and privacy.

To test the further hypotheses, we conducted a variance-based structural model estimation to compute the impact of risk types on overall risk and its influence on purchase intention. Results show that not every risk type impacts the perceived overall risk, only several risk types emerged to significantly contribute depending on the digitalization level of the pharmacy. Interestingly, solely social risk shows a significant influence on overall risk for BMPs with a DSD. This means that the judgment of the overall risk of purchasing OTC medications in a digitalized BMP depends on the fear of being rejected by the social reference group. For BMPs with a CD significant effects are found for physical, social, and privacy risk types. Interestingly, for this traditional purchase condition, the concern of being rejected by the social reference group is also significant for the evaluation of the overall risk. In addition, there is the fear of harm to health due to the product properties and discomfort with the purchase due to the product presentation, alongside the fear of disclosing data to third parties during the purchase. In OPs, performance, psychological, and privacy risks significantly contribute to overall risk. In fully digital pharmacy environments, customer concerns about making the wrong purchase decision based on product presentation, in addition to concerns about buying products that are inappropriate for the purpose and sharing data with third parties during the purchase, contribute significantly to the overall risk score.

The results show that financial risk does not contribute to the overall risk perception of customers in the types of pharmacies studied for the sale of OTC drugs. In addition, the results highlight the influence of social risk as a barrier to purchase in BMPs and particularly those using DSDs, as this type of risk is perceived at a low level but contributes to high overall perception of risk in these pharmacies. This suggests that social risk is particularly important in understanding customers' purchase intentions in BMPs with DSDs, although the ratings do not show significant differences between the BMPs and BMPs with DSDs and OPs.

We also find that across all purchase conditions, the greater the perceived overall risk, the lower the purchase intention. In addition, we evaluated the magnitude of purchase intention and found that it is lowest for OPs and highest for BMPs with CD. Moreover, surprisingly, the overall risk in OPs is positively correlated with purchase intention in BMPs with CD, which could be interpreted as a factor promoting the purchase in BMPs with CD.

Besides, we estimated the coefficient of determination, R^2. In general, the R^2 values for the overall risks showed values around 0.3, which can be interpreted as a high predictive power of the risk types for the overall risk, when compared with consumer studies (Hair et al. 2017), as R^2 describes the proportion of explained variance in the overall risk by the exogenous latent variables as preliminary constructs. Scholars debate the magnitude of R^2 and largely agree that the value should be assessed in comparison to studies examining the same dependent variable (Benitez et al. 2020). In terms of theoretical background, there are many studies on perceived purchase risk, but as described in the theoretical framework, this construct is highly dependent on product type and distribution channel. Regarding related studies, either no R^2 were reported (e.g., Rozano Suplet et al. 2009) or studies considered perceived risk as an independent variable (e.g., Büttner et al. 2006; Yin et al. 2016; Mortimer 2018; Mortimer et al. 2019).

Further, the R^2 values for PI were consistently higher than those of OR, but we remain primarily interested in uncovering the significant impact of OR on PI.

All calculations were performed controlling for personality traits and experience-based variables that might influence ratings.

We controlled for interpersonal trust and readiness to take risks as personality traits. Increasing interpersonal trust was positively related to an increase in risk types in digitalized pharmacies, namely performance risk among OPs and financial risk among BMPs with a DSD. In contrast, interpersonal trust lowers physical and social risk perceptions

in BMPs with CDs and overall risk in BMPs with DSDs. Moreover, increasing interpersonal trust increases purchase intention in BMPs with a CD. The latter findings underscore the high appreciation of the trust relationship between customers and pharmacists (Dölger 2021), which in traditional retail channels, i.e., BMPs, is particularly established and experienced through interpersonal contact.

The personality trait readiness to take risks enhances social risk perception in all purchase conditions. The reasons for this effect can be worth further investigation, especially for digitalized BMPs, where social risk is a significant barrier to purchase.

Of the experience-based control variables that we defined as familiarity with the conditions of purchase investigated, familiarity with BMPs in general showed predominantly increasing effects on risk types and a reducing effect on purchase intention in digitalized pharmacies. For BMPs with a DSD, it has an increasing effect on performance and psychological risks, but nevertheless also increases purchase intention, which may be related to the reducing effect on the social risk as a significant barrier to purchase in these pharmacies. Additionally, it increases purchase intention in BMPs with CDs. Familiarity with BMPs with DSDs shows a reducing effect on overall risk and consequently an increasing effect on purchase intention in BMPs with DSDs. Furthermore, familiarity with OPs increases overall risk perception in BMPs with DSDs, while decreasing perceived performance risk in these pharmacies. This could be an indication that the product presentation is perceived similarly in both digital buying situations. For OPs, familiarity with OPs decreases performance and privacy risk and consequently increases purchase intention, as both types of risk are significant barriers to purchasing in OPs. In summary, familiarity with a purchasing situation has a positive influence on purchase intention in each of these purchasing conditions.

CRITICAL EVALUATION OF THE MAIN FINDINGS

The hypotheses on psychological, financial, and privacy risks are supported for the comparison of digitalized BMPs with OPs, whereas the hypotheses on performance, physical, and social risks are rejected. Similarly, only the hypotheses for financial and privacy risk are upheld for the comparison between non-digitalized and digitalized BMPs.

Starting with the hypothesis on performance risk, which stated that due to increased mental tangibility, the risk in BMPs with a DSD could be perceived as lower than in BMPs with a CD, which turned out to have the opposite effect. Since the mental tangibility on the internet increases by huge product information access (Eggert 2006), we drew on similarities between the presentation on DSDs and OPs. An explanation for this opposite effect may be that mental tangibility did not increase as hypothesized or that other effects contributed to the result, which we have not considered. Similar arguments are valid for the different results in the perceived physical risk. This risk type addresses the harm to health due to the product and its presentation, which includes expired products and incorrect product information. We based our hypothesis predominantly on considerations of the purchase situation and on former study results gained in an investigation in pharmacy salesrooms (Ersöz and Schröder 2022). Subsequently, the question arises why these results are different. An explanation could be that the pharmacy store environment in the former study produced a different perception than the images presented in this online evaluation. Moreover, a social desirability bias can be ruled out for the current results but hardly for the former results because participants were interviewed on the sales floor of pharmacies (Krumpal 2013). The third hypothesis on social risk could not be supported for the comparison of BMPs with a DSD, despite the possible discrepancy with traditional values in the pharmacy business and the image change due to digitalization, which could lead to rejection by the social reference group. The results only showed that social risks are perceived significantly higher in OPs than in BMPs with CD, but both at a low level. This result may be influenced by personal counseling and the highly valued relationship of trust with pharmacists among BMPs (Mortimer 2018; Mortimer et al. 2019; Dölger 2021), which may be an influencing factor for confirmation by social reference groups. Interestingly, there is no difference between OPs and BMPs with a DSD. Because social risk has a significant impact on overall risk only for BMPs, but not for OPs, and is also the only risk type that contributes significantly to overall risk for digitalized BMPs, future studies should examine this risk type more intensively to examine the reasons and remedies for this barrier to purchase in digitalized pharmacies.

Coming to other interesting findings, most of the risk types are perceived equally in BMPs with a DSD compared to OPs. Implementing DSDs in BMPs can therefore be seen as a risk increase over the baseline (CD), which puts them roughly on par with OPs. Increased risk perception when shopping online compared to shopping in stores has already been demonstrated in other studies (Bezes 2016). These results extend the knowledge about the use of digital sales tools in stores, as they show that DSD increases risk perception to almost the same level as online shopping. In OPs, individuals are more concerned that their data will be disclosed than in digitalized BMPs. In addition, OPs score better in terms of financial risk. In sum, BMPs with a DSD do not appear to offer an advantage over OPs when concluding from the comparison of these risk types.

The further results on the structure of the perceived overall risk show that all risk types except financial risk contribute to the overall risk in at least one of the three presentation types, but significant risk types differ considerably between the presentation types. Similar results were found in studies that compared BMPs with supermarkets (Mortimer 2018; Mortimer et al. 2019). Our findings imply that even for the nearly identical study subjects, perceived purchase risk can vary widely in composition. However, the nonsignificant relationships between the risk types and overall risk do not mean that the hypothesis tests are meaningless, because each risk type yielded values above zero, implying risk is present. Rather, the results show to what extent these risk types, which are second-order contributors to purchase intention, can represent the latent construct of overall purchase risk. However, future investigations should consider further risk types, such as time risk, which might have an impact on the perceived overall risk. Although the financial risk is not a significant contributor to the overall perception of risk under the purchase conditions studied, eliminating this type of risk could be a mistake in the face of market and price changes.

LIMITATIONS

Predominantly younger-aged people participated in the study with a fairly low income. Additionally, the gender distribution was not well-balanced with only 2% non-binary participants and 68% females. These described skewness's are a well-known problem in social science (O'Rourke and Lakner 1989). To compensate for these skewness's, weighting methods were considered to calculate the effects, but due to the distortion that can also result from this, they were not used. Particularly in the age and gender groups, weighting to better reflect the smaller groups in the results can lead to individual opinions being given too much weight and thus very strongly distorting the results (Field 2018; Riepl 12.03.2012; Gabler and Ganninger 2010). The effects of familiarity must be considered under the limitation that we do not know what experience they are based on, and the pharmacy market is very heterogeneous.

IMPLICATIONS FOR PRACTICE

The answer to the question of whether to use a digital signage display for OTC drugs is twofold. On the one hand, clearly perceived purchase risks are predominantly higher when using a digital display compared to the conventional shelf presentation method. Purchase intention is also lower in digitalized pharmacies than in non-digitalized ones. Nevertheless, increasing familiarity with pharmacies that use digital signage displays decreases the overall risk perception and increases the purchase intention in those pharmacies. Additionally, familiarity with BMPs in general increases the purchase intention in digitalized BMPs. This indicates that digital signage displays may be more preferred in brick-and-mortar retail. Moreover, the only purchase barrier in pharmacies equipped with digital signage displays is found to be the social risk which is perceived as low and shows no differences compared to the other pharmacy types. From these results, it can be concluded that there are reasons that oppose the adoption of digital signage displays on the sales floor of pharmacies, but these reasons could change or disappear as customers become increasingly familiar with digitalized pharmacies.

CONCLUSION

Customers will continue to shop at both non-digitalized and digitalized brick-and-mortar pharmacies, as well as online pharmacies in Germany. The current study sows that customers' intentions to purchase medicines in the forms of presentation and distribution studied are related to their perceived degree of risk. Perceptions of social risk proved to be a barrier to purchasing over-the-counter drugs when presented on digital signage displays, although this was the only risk type perceived at a low level. The performance, psychological, physical, financial, and privacy risk types are rated high for digitalized OTC displays, which is higher than for conventional displays and at the same level as online pharmacies. Digitalized brick-and-mortar pharmacies score lower than online pharmacies on privacy risk, but higher when it comes to financial risk. For non-digitalized pharmacies, the physical, social, and privacy risk types have been identified as barriers to the purchase. In online pharmacies, barriers are performance, psychological, and privacy risk types. All in all, this study shows that perceived risks from digital signage displays are quite high and that trust towards pharmacies and familiarity effects can be considered when deciding to adopt digital signage displays. This study contributes to a better understanding of purchasing barriers for non-prescription drugs depending on their presentation from the customer's perspective.

REFERENCES

ABDA – Bundesvereinigung Deutscher Apothekerverbände e. V. (Ed.) (2021): *Die Apotheke: Zahlen, Daten, Fakten 2021*.

Abzakh, A.A., Ling, K.C., Alkilani, K. (2013): The impact of perceived risks on the consumer resistance towards generic drugs in the malaysia pharmaceutical industry. *International Journal of Business and Management*. 8, 42–50. https://doi.org/10.5539/ijbm.v8n3p42.

Albrecht, M., der Heiden, I. an, Brenck, A., Ochmann, R., Schiffhorst, G. (2020): *Ökonomisches Gutachten zum Apothekenmarkt*. IGES Institut und Deutsches Institut für Wirtschaftsforschung e.V. Berlin.

Allport, G.W. (1937): *Personality: A psychological interpretation*. New York: H. Holt.

Alwon, B.M., Solomon, G., Hussain, F., Wright, D.J. (2015): A detailed analysis of online pharmacy characteristics to inform safe usage by patients. *International Journal of Clinical Pharmacy*. 37, 148–158. https://doi.org/10.1007/s11096-014-0056-1.

Ashford, R., Cuthbert, P., Shani, N. (2000): Perceived risk and consumer decision making related to health services: a comparative study. *International Journal of Nonprofit and Voluntary Sector Marketing*. 5, 58–72.

Bauer, R.A. (1960): Consumer Behaviour as Risk Taking. In: Hancock, R.S. (Ed.): Dynamic Marketing for a Changing World: Proceedings of the 43rd. *Conference of the American Marketing Association*; S. 389–398. Chicago, Illinois: American Marketing Association.

Beauchamp, M.B., Ponder, N. (2010): Perceptions of retail convenience for in-store and online shoppers. *The Marketing Management Journal*. 20, 49–65.

Beierlein, C., Kemper, C.J., Kovaleva, A.J., Rammstedt, B. (2014): Interpersonales Vertrauen (KUSIV3). https://doi.org/10.6102/ZIS37.

Beierlein, C., Kovaleva, A.J., Kemper, C.J., Rammstedt, B. (2015): Kurzskala zur Erfassung der Risikobereitschaft (R-1). https://doi.org/10.6102/ZIS236.

Benitez, J., Henseler, J., Castillo, A., Schuberth, F. (2020): How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research. *Information & Management.* 57, 103168. https://doi.org/10.1016/j.im.2019.05.003.

Benkenstein, M. (2008): *Neue Herausforderungen an das Dienstleistungsmarketing*. Wiesbaden: Betriebswirtschaftlicher Verlag Dr. Th. Gabler.

Bezes, C. (2016): Comparing online and in-store risks in multichannel shopping. *International Journal of Retail & Distribution Management*. 44. https://doi.org/10.1108/IJRDM-02-2015-0019.

Brody, R.P., Cunningham, S.M. (1968): Personality Variables and the Consumer Decision Process. *Journal of Marketing Research*. 5, 50. https://doi.org/10.2307/3149793.

Burke, R.R. (2009): Behavioral Effects of Digital Signage. *Journal of Advertising Research*. 49, 180–185. https://doi.org/10.2501/S0021849909090254.

Büttner, O.B., Göritz, A.S. (2008): Perceived trustworthiness of online shops. *Journal of Customer Behavior*. 7, 35–50. https://doi.org/10.1002/cb.235.

Büttner, O.B., Schulz, S., Silberer, G. (2006): Perceived risk and deliberation in retailer choice: Consumer behavior towards online pharmacies. *Advances in Consumer Research*. 33, 197–202.

Campbell, M.C., Goodstein, R.C. (2001): The moderating effect of perceived risk on consumers' evaluations of product incongruity: Preference for the norm. *Journal of Consumer Research*. 28, 439–449. https://doi.org/10.1086/323731.

Carlson, J., O'Cass, A. (2010): Exploring the relationships between e-service quality, satisfaction, attitudes and behaviours in content-driven e-service web sites. *Journal of Services Marketing*. 24, 112–127. https://doi.org/10.1108/08876041011031091.

Charness, G., Gneezy, U., Kuhn, M.A. (2012): Experimental methods: Between-subject and within-subject design. *Journal of Economic Behavior & Organization*. 81, 1–8. https://doi.org/10.1016/j.jebo.2011.08.009.

Cohen, J. (1988*): Statistical power analysis for the behavioral sciences.* Second Edition. Hillsdale, NJ: Erlbaum; s. bes. S. 567.

Conlon, C.T., Mortimer, J.H. (2013): Demand Estimation Under Incomplete Product Availability. *American Economic Journal: Microeconomics.* 5, 1–30. https://doi.org/10.1257/mic.5.4.1.

Cox, D.F., Rich, S.U. (1964): Perceived risk and consumer decision-making - the case of telephone shopping. *Journal of Management Research.* 1, 32–39. https://doi.org/10.1177/002224376400100405.

Cunningham, S.M. (1967): The Major Dimensions of Perceived Risk. In: Cox, D.F. (Ed.): *Risk-Taking and Information Handling in Consumer Behavior*; S. 82–101. Boston: Harvard University Press.

Dekimpe, M.G., Geyskens, I., Gielens, K. (2020): Using technology to bring online convenience to offline shopping. *Marketing Letters.* 31, 25–29. https://doi.org/10.1007/s11002-019-09508-5.

Dennis, C., Newman, A., Michon, R., Josko Brakus, J., Tiu Wright, L. (2010): The mediating effects of perception and emotion: Digital signage in mall atmospherics. *Journal of Retailing and Consumer Services*. 17, 205–215. https://doi.org/10.1016/j.jretconser.2010.03.009.

Derbaix, C. (1983): Perceived risk and risk relievers: An empirical investigation. *Journal of Economic Psychology*. 3, 19–38. https://doi.org/10.1016/0167-4870(83)90056-9.

Ditzel, P. (2018a): Die Apotheke als digital vernetzte Erlebniswelt. Stuttgart; https://www.deutsche-apotheker-zeitung.de/news/artikel/2018/06/06/die-apotheke-als-digital-vernetzte-erlebniswelt.

Ditzel, P. (2018b): Virtuelle Sicht- und Freiwahl: Die Apotheke als digital vernetzte Erlebniswelt. *Deutsche Apotheker Zeitung*. 41, 56–61.

Dölger, C. (2021): Menschen vertrauen besonders den Vor-Ort-Apotheken: BAH-Versorgungsindex; https://www.pharmazeutische-zeitung.de/menschen-vertrauen-besonders-den-vor-ort-apotheken-123843/.

Dowling, G.R. (1986): Perceived risk: The concept and its measurement. *Psychology & Marketing.* 3, 193–210. https://doi.org/10.1002/mar.4220030307.

Dowling, G.R., Staelin, R. (1994): A model of perceived risk and intended risk-handling activity. *Journal of Consumer Research*. 21, 119–134. https://doi.org/10.1086/209386.

Eggert, A. (2006): Intangibility and Perceived Risk in Online Environments. *Journal of Marketing Management*. 22, 553–572. https://doi.org/10.1362/026725706777978668.

Ersöz, S., Schröder, H.: Presenting OTC Drugs on Digital Signage: Effects on the Perceived Purchase Risk. In:Bruhn, Hadwich (Hg.) 2022 – *Forum Dienstleistungsmanagement*; S. 529–555.

Escalas, J.E., Bettman, J.R. (2005): Self-construal, reference groups, and brand meaning. *Journal of Consumer Research*. 32, 378–389. https://doi.org/10.1086/497549.

Field, A. (2018): *Discovering statistics using IBM SPSS statistics*. 5. Ed. Los Angeles, London, New Delhi (usw.): SAGE.

Fittler, A., Vida, R.G., Káplár, M., Botz, L. (2018): Consumers Turning to the Internet Pharmacy Market: Cross-Sectional Study on the Frequency and Attitudes of Hungarian Patients Purchasing Medications Online. *Journal of Medical Internet Research*. 20, e11115. https://doi.org/10.2196/11115.

Fortune Business Insights (2019): ePharmacy Market Size, Share and Industry Analysis By Product (Over-The-Counter Products, Prescription Medicine) and Regional Forecast, 2019-2026, Pressemitteilung vom 2019; https://www.fortunebusinessinsights.com/industry-reports/epharmacy-market-100238.

Gabler, S., Ganninger, M. (2010): Gewichtung. In: Wolf, C., Best, H. (Eds.): *Handbuch der sozialwissenschaftlichen Datenanalyse*; S. 143–164. Wiesbaden: VS Verlag für Sozialwissenschaften.

Hair, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M., Richter, N.F., Hauff, S. (2017): *Partial Least Squares Strukturgleichungsmodellierung: Eine anwendungsorientierte Einführung*. München: Vahlen.

Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M. (2019): When to use and how to report the results of PLS-SEM. *European Business Review*. 31, 2–24. https://doi.org/10.1108/EBR-11-2018-0203.

Hair, J.F., Sarstedt, M., Ringle, C.M., Gudergan, S. (2018): *Advanced issues in partial least squares structural equation modeling.* Los Angeles, London, New Delhi (usw.): SAGE.

He, H., L., Y., Harris, L. (2012): Social identity perspective on brand loyalty. *Journal of Business Research.* 65, 648–657. https://doi.org/10.1016/j.jbusres.2011.03.007.

Henseler, J., Ringle, C.M., Sarstedt, M. (2016): Testing measurement invariance of composites using partial least squares. *International Marketing Review*. 33, 405–431. https://doi.org/10.1108/IMR-09-2014-0304.

Hisrich, R.D., Dornoff, R.J., Kernan, J.B. (1972): Perceived risk in store selection. *Journal of Management Research*. 9, 435–439.

Holtgräfe, C., Zentes, J. (2012): Multifaceted determinants of online non-prescription drug information seeking and the impact on consumers' use of purchase channels. *Health Informatics Journal.* 18, 95–110. https://doi.org/10.1177/1460458212439487.

Hopping, D. (2000): Technology in retail. *Technology in Society*. 22, 63–74. https://doi.org/10.1016/S0160-791X(99)00042-1.

Jacoby, J., Kaplan, L.B. (1972): Components of Perceived Risk. In: Venkatesan, M. (Ed.): SV - *Proceedings of the Third Annual Conference of the Association for Consumer Research*; S. 382–393. Chicago, Illinois: Association for Consumer Research.

Jayawardhena, C., Tiu Wright, L., Dennis, C. (2007): Consumers online: intentions, orientations and segmentation. *International Journal of Retail & Distribution Management*. 35, 515–526. https://doi.org/10.1108/09590550710750377.

Jharap, A. (2017): Consumers' Attitude Toward Generic OTC Drugs: Examining the Effects of Perceived Risk and Consumer Knowledge. Master Thesis. Rotterdam: Erasmus School of Economics.

Jiang, L.A., Yang, Z., Jun, M. (2013): Measuring consumer perceptions of online shopping convenience. *Journal of Service Management.* 24, 191–214. https://doi.org/10.1108/09564231311323962.

Ju, I., Lee, H. (2017): Dynamics of consumer decision making of over-the-counter drugs: Evaluating product comparison claims and moderating role of price consciousness. *Journal of Communication in Healthcare*. 10, 88–99. https://doi.org/10.1080/17538068.2017.1337605.

Kahneman, D., Tversky, A. (1979): Prospect theory: An analysis of decision under risk. *Econometrica.* 47, 263–291.

Kam, C.D. (2012): Risk Attitudes and Political Participation. *American Journal of Political Science*. 56, 817–836. https://doi.org/10.1111/j.1540-5907.2012.00605.x.

Kaplan, L.B., Szybillo, G.J., Jacoby, J. (1974): Components of perceived risk in product purchase: A cross-validation. *Journal of Applied Psychology*. 59, 287–291.

Kim, M., Lennon, S. (2008): The effects of visual and verbal information on attitudes and purchase intentions in internet shopping. *Psychology & Marketing*. 25, 146–178. https://doi.org/10.1002/mar.20204.

Koller, M. (1988): Risk as a Determinant of Trust. *Basic and Applied Social Psychology*. 9, 265–276. https://doi.org/10.1207/s15324834basp0904_2.

Krumpal, I. (2013): Determinants of social desirability bias in sensitive surveys: a literature review. *Quality & Quantity*. 47, 2025–2047. https://doi.org/10.1007/s11135-011-9640-9.

Kumar, R., Sachan, A., Dutta, T. (2020): Examining the Impact of e-Retailing Convenience Dimensions on Behavioral Intention: The Mediating Role of Satisfaction. *Journal of Internet Commerce.* 19, 466–494. https://doi.org/10.1080/15332861.2020.1788367.

Laroche, M., McDougall, G.H.G., Bergeron, J., Yang, Z. (2004): Exploring how intangibility affects perceived risk. *Journal of Service Research*. 6, 373–389. https://doi.org/10.1177/1094670503262955.

Laroche, M., Yang, Z., McDougall, G.H.G., Bergeron, J. (2005): Internet versus bricks-and-mortar retailers: An investigation into intangibility and its consequences. *Journal of Retailing*. 81, 251–267. https://doi.org/10.1016/j.jretai.2004.11.002.

Li, E.P.H. (2017): Cognitive Styles and Personality in Risk Perception. In: Emilien, G., Weitkunat, R., Lüdicke, F. (Eds.): *Consumer Perception of Product Risks and Benefits*; S. 267–282. Cham: Springer International Publishing.

Liljander, V., Polsa, P., van Riel, A. (2009): Modelling consumer responses to an apparel store brand: Store image as a risk reducer. *Journal of Retailing and Consumer Services*. 16, 281–290. https://doi.org/10.1016/j.jretconser.2009.02.005.

Lingenfelder, M. (2001): Die Identifikation und Bearbeitung von Online-Käufersegmenten: Ergebnisse einer empirischen Untersuchung. In: Fritz, W. (Ed.): *Internet-Marketing: Marktorientiertes E-Business in Deutschland und den USA*. 2. Ed; S. 373–397. Stuttgart: Schäffer-Poeschel.

Ma, L. (2021): Understanding non-adopters' intention to use internet pharmacy: Revisiting the roles of trustworthiness, perceived risk and consumer traits. *Journal of Engineering and Technology Management.* 59. https://doi.org/10.1016/j.jengtecman.2021.101613.

Malhotra, N.K., Kim, S.S., Agarwal, J. (2004): Internet users' information privacy concerns (IUIPC): The construct, the scale, and a causal model. *Information Systems Research*. 15, 336–355. https://doi.org/10.1287/isre.1040.0032.

Mayer, R.C., Davis, J.H., Schoorman, F.D. (1995): An Integrative Model of Organizational Trust. *Academy of Management Review.* 20, 709–734. https://doi.org/10.2307/258792.

McKnight, D.H., Cummings, L.L., Chervany, N.L. (1998): Initial trust formation in new organizational relationships. *Academy of Management Review*. 23, 473. https://doi.org/10.2307/259290.

McKnight, Kacmar, Choudhury (2004): Dispositional Trust and Distrust Distinctions in Predicting High- and Low-Risk Internet Expert Advice Site Perceptions. *e-Service Journal*. 3, 35. https://doi.org/10.2979/esj.2004.3.2.35.

Mitchell, V.-W. (1999): Consumer perceived risk: Conceptualisations and models. *European Journal of Marketing*. 33, 163–195.

Miyazaki, A.D., Fernandez, A. (2001): Consumer Perceptions of Privacy and Security Risks for Online Shopping. *Journal of Consumer Affairs*. 35, 27–44. https://doi.org/10.1111/j.1745-6606.2001.tb00101.x.

Mortimer, G. (2018): Examining the impact of trust and perceived risk on purchase intentions of unscheduled medicines in supermarkets. *Journal of Pharmacy Practice and Research*. 48, 124–131. https://doi.org/10.1002/jppr.1359.

Mortimer, G., Grimmer, L., Fazal-E-Hasan, S.M. (2019): Examining consumer purchase intentions of non-prescription medicines in supermarkets and community pharmacies. *International Journal of Pharmacy Practice*. 27, 232–240. https://doi.org/10.1111/ijpp.12494.

Nepomuceno, M.V., Laroche, M., Richard M. (2014): How to reduce perceived risk when buying online: The interactions between intagibility, product knowledge, brand familiarity, privacy and security concerns. *Journal of Retailing and Consumer Services*. 21, 619–629. https://doi.org/10.1016/j.jretconser.2013.11.006.

Nicholson, N., Soane, E., Fenton-O'Creevy, M., Willman, P. (2005): Personality and domain-specific risk taking. *Journal of Risk Research.* 8, 157–176. https://doi.org/10.1080/1366987032000123856.

Nunnally, J.C. (1994): *Psychometric theory*. Third Edition. New York: Tata McGraw-Hill Education; s. bes. S. 752.

O'Rourke, D., Lakner, E. (1989): Gender bias: Analysis of factors causing male underrepresentation in surveys. *International Journal of Public Opinion Researc*h. 1, 164–176.

Park, C.-H., Kim, Y.-G. (2003): Identifying key factors affecting consumer purchase behavior in an online shopping context. *International Journal of Retail & Distribution Management*. 31, 16–29. https://doi.org/10.1108/09590550310457818.

Pramuk, M. (2020): Development and Validation of a scale to measure the perceived benefits and risks of online pharmacy stores. *International Journal of Pharmaceutical Research*. 12, https://doi.org/10.31838/ijpr/2020.12.03.027

Rains, S.A., Donnerstein Karmikel, C. (2009): Health information-seeking and perceptions of website credibility: Examining web-use orientation, message characteristics, and structural features of websites. *Computers in Human Behavior.* 25, 544–553. https://doi.org/10.1016/j.chb.2008.11.005.

Ricks, J., Mardanov, I. (2012): The effect of pharmacists on drug purchasing behavior of price-sensitive consumers. *Journal of Medical Marketing.* 12, 177–187. https://doi.org/10.1177/1745790412445799.

Riepl, W. (2012): Gewichtung mit SPSS Syntaxbeispiel: Gewichtung, Grundgesamtheit, Repräsentativität, Stata, Syntax; https://statistik-dresden.de/archives/976#.

Rozano Suplet, M., Gomez Suarez, M., Diaz Martin, A.M. (2009): Customer perceptions of perceived risk in generic drugs: The Spanish market. *Innovar.* 19, 53–64.

Sabbir, M.M., Islam, M., Das, S. (2021): Understanding the determinants of online pharmacy adoption: A two-staged SEM-neural network analysis approach. *Journal of Science Technology and Policy Management*, 666–687. https://doi.org/10.1108/JSTPM-07-2020-0108.

Santos, E.O. (2021): Exploring the Factors that influence the Adoption of Online Pharmacy in Portugal: A Study on Consumer's Acceptance and Pharmacist's Perception. Dissertation. University of Porto.

Sapic, S., Kocić, M., Radakovic, K. (2019): Creating consumer loyalty in the field of using over-the-counter products. *Economic Themes*. 57, 1–20. https://doi.org/10.2478/ethemes-2019-0001.

Saydiya, F., Rashi, M., Savita, S., Anupam, G. (2019): E-Buying of Medicines: Trends and Factors Influencing Online Pharmacy. *International Journal of Marketing and Business Communication*.

Siegrist, M., Gutscher, H., Earle, T.C. (2005): Perception of risk: the influence of general trust, and general confidence. *Journal of Risk Research*. 8, 145–156. https://doi.org/10.1080/1366987032000105315.

Sjöberg, L. (2001): Limits of knowledge and the limited importance of trust. *Risk Analysis*. 21, 189–198. https://doi.org/10.1111/0272-4332.211101.

smile - Business Intelligence (2021): Das E-Rezept kommt - Wer profitiert am meisten?; https://www.smile.bi/das-e-rezept-kommt/ (accessed 5/3/2022).

Smith, H.J., Milberg, S.J., Burke, S.J. (1996): Information privacy: Measuring individuals' concerns about organizational practices. *MIS Quarterly*. 20, 167–196. https://doi.org/10.2307/249477.

Stone, R.N., Grønhaug, K. (1993): Perceived risk: Further considerations for the marketing discipline. *European Journal of Marketing*. 27, 39–50. https://doi.org/10.1108/03090569310026637.

Tebroke, E. (2019): Die Konsolidierung des Martkts: Studie zum Apothekenversandhandel; https://www.pharmazeutische-zeitung.de/die-konsolidierung-des-markts/ (accessed 11/24/2020).

van de Sanden, S., Willems, K., Poncin, I., Brengman, M. (2020): Digital Signage in the Store Atmosphere: Balancing Gains and Pains. In: Pantano, E. (Ed.): *Retail Futures*; S. 53–69. Emerald Group Publishing Limited.

Wang, Y.D., Emurian, H.H. (2005): An overview of online trust: Concepts, elements, and implications. *Computers in Human Behavior*. 21, 105–125. https://doi.org/10.1016/j.chb.2003.11.008.

Wieringa, J.E., Reber, K.C., Leeflang, P. (2015): Improving pharmacy store performance: The merits of over-the-counter drugs. *European Journal of Marketing*. 49, 1276–1299. https://doi.org/10.1108/EJM-06-2013-0331.

Wolff, K., Larsen, S., Øgaard, T. (2019): How to define and measure risk perceptions. *Annals of Tourism Research*. 79, 102759. https://doi.org/10.1016/j.annals.2019.102759.

Woodruffe-Burton, H., Wakenshaw, S. (2011): Revisiting experiential values of shopping: Consumers' self and identity. *Marketing Intelligence & Planning*. 29, 69–85. https://doi.org/10.1108/02634501111102760.

Yin, M., Li, Q., Qiao, Z. (2016): A study on consumer acceptance of online pharmacies in China. In: Ishida, T., Sadeh, N., Lee, J.K., Casalegno, F., Kim, W., Kim, S., Yang, S.-B. (Eds.) *Proceedings of the 18th Annual International Conference on e-Commerce in Smart connected World*. New York, NY, USA: ACM Press, 1–8.

Zuckerman, M. (2007): Sensation seeking and risky behavior. Washington, DC: American Psychological Association (APA).

ANNEX 1: RELATED LITERATURE OVERVIEW

Study	**Objectives**	Channel (internet: i, retailer: r)	**Investigated Risk Types**	**Relevant Findings**
Jarvenpaa and Todd (1997)	Examines the risk types in internet shopping via open-ended questionnaires	i	Financial (Economic), Performance, Psychological (Personal), Social, Privacy	Performance and personal risks (credit card loss) are identified key factors for internet shopping.
Ashford et al. (2000)	Compares health services with goods and general services regarding perceived risk types	r	Financial, Physical, Psychological, Social, Convenience (Time)	Health services show increased social and psychological risks.
Forsythe and Shi (2003)	Examines perceived risk's impact on e-commerce adoption. Compares browsers, moderate shoppers, and heavy shoppers	i	Financial, Product, Performance, Psychological, Time	Except for performance risk, other risk types' perceptions decrease with increasing experience. Performance risk is perceived higher by moderate shoppers than by browsers.
Laroche (2004)	Examines the impact of mental, physical, and general intangibility on perceived fisk for brands and non-branded goods, and goods and services		Financial, Performance, Psychological, Social, Time	Only mental intangibility is significantly correlated with financial, performance, psychological, social, and time risk. The relationship between intangibility and perceived risk is stronger for brands than for non-branded goods. Physical intangibility is more strongly associated with perceived risk for goods as opposed to services. As services are usually physically intangible, this feature does not have a direct impact on perceived risk.
Eggert (2006)	Effects of Intangibility on the perceived risk in online vs. in-store shopping for branded vs. generic products	i.r	Financial, Performance, Psychological, Social, Time	Except for social risk, the other risk types were perceived as higher online than offline. The Internet was found to lessen the influence of intangibility on perceived risk due to the fact that it provides a large amount of product-related information, which in return helps the consumer to better visualize and understand the products.
Büttner et al. (2006)	Examines for high/low-risk medicines and high/low-risk online pharmacies effects on likelihood and magnitude of perceived risks	i	Privacy, Time, Performance, Financial, Time	High retailer risk influences the likelihood of negative outcomes. High product risk influences the magnitude. Loss of medical privacy and time risks are heightened for high-risk products. High-risk products induced a high search for information.
Büttner, Göritz (2008)	Examines the relation of trustworthiness and perceived risk on purchase intention in online pharmacies	i	not specified	Increasing perceived risk lowers purchase intention. The relation is partially mediated by the decrease in the perceived trustworthiness of the seller. Moreover, the effect of perceived risk on purchase intention is smaller than the effect of perceived trustworthiness.

Study	**Objectives**	Channel (internet: i, retailer: r)	**Investigated Risk Types**	**Relevant Findings**
Crespo et al. (2009)	Compares online non-buyers and buyers perceived risk in Internet shopping and purchase intention	i	Financial, Performance, Psychological, Social, Time, Privacy	All included risk types are relevant for online shopping. In both groups, financial and performance risks are the most relevant risk types for future purchase intention. Social risk is less significant for non-buyers than buyers.
Rozano Suplet et al. (2009)	Examines the risk types' relation and importance for overall risk perception for generic drugs in Spain	r	Financial, Performance, Physical, Psychological, Social, Time	For the purchase of generic drugs, time risk does not influence overall risk. Physical, social, performance, and financial risks are mediated through psychological risk. Psychological and physical risk directly impact overall risk perception.
Abzakh et al. (2013)	Investigates the risk types relation and importance for customer resistance towards generic drugs in Malaysia	r	Financial, Performance, Physical, Psychological, Social, Time	Performance and physical risk positively influence the resistance toward generic drugs.
Nepomuceno et al. (2014)	Effects of intangibility on perceived risk for several products with manipulation for mental and physical tangibility		Performance, Time, Financial	Over all products, the perceived risks were less in the mental tangible condition than in the physical tangible condition.
Yin (2016)	Investigates the adoption of online pharmacies against the background of perceived risk, trust, and further potential drivers in China	i	not specified	Perceived trust and perceived risk directly influence consumers' adoption intention of online medicine purchases, while perceived trust has a significant negative influence on perceived risk.
Sabbir et al. (2020)	Examines the determinants of online pharmacy adoption in Bangladesh	i	not specified	Perceived risk has no significant impact on online pharmacy adoption in Bangladesh for the young generation of buyers.
Jharap (2017)	Examines perceived risks influence on attitude toward generic OTC drugs		Financial, Performance, Physical	Financial risk negatively influences the attitude toward generic OTC drugs.
Mortimer (2018)	Identifies risk types for the purchase of OTC drugs in supermarkets in Australia	r	Physical, Psychological, Social, Time	Psychological and social risks lowered customers' purchase intention in supermarkets.
Mortimer (2019)	Compares BMPs with supermarkets for the purchase of OTC drugs in Australia	r	Physical, Psychological, Social, Time	Physical and social risk lowered purchase intention in supermarkets. Time risk negatively influenced the purchase intention in BMPs.
Sapic et al. (2019)	Identifies factors for loyalty in purchasing OTC drugs	r	not specified	The greater the perceived risk toward OTC drugs the higher the loyalty towards familiar drugs.
Santos (2021)	Explores the drivers and barriers of online pharmacy adoption in Portugal via a mixed-methods approach	i	not specified	Barriers to the online purchase of medication were found to be the lack of knowledge of the service, lack of trust, and lack of advice on products and their use.

Study	**Objectives**	Channel (internet: i, retailer: r)	**Investigated Risk Types**	**Relevant Findings**
Ma (2021)	Examines the influence of trustworthiness, perceived risk, and consumer traits on non-adopters intention to use online pharmacies	i	not specified	Perceived risk negatively affects trustworthiness but has no impact on the use intention of non-adopters.